

Claims

1. Conveying device for transporting a conveyable product, particularly a flowable product, with an essentially cylindrical chamber, in which at least one shaft is disposed, which extends along the axis of the cylinder, each shaft having a plurality of first conveying elements (21, 22, 23, 24, 31, 32, 33, 34, ..., 61, 62, 63, 64) for transporting the product in a product-conveying direction F, which extend radially from the shaft and are connected with the shaft in each case at a connecting site on the surface of the shaft, the individual connecting sites being disposed along a helical line at the surface of the shaft and the plurality of first conveying elements (21, 22, 23, 24, 31, 32, 33, 34, ..., 61, 62, 63, 64) forming a first flight, corresponding to the helical line, with a first so-called discontinuous web, which extends helically about the surface of the shaft, characterized in that further elements (2 to 15), which protrude into the first flight, are disposed at least in partial regions A of the first flight.

2. The conveying device of claim 1, characterized in that the further elements (2 to 15) also are conveying elements for transporting product.

3. The conveying device of claims 1 or 2, characterized in that the further elements form at least one further, discontinuous web, which extends along and within the first flight in such a manner, that the first flight is divided into at least two partial flights at least in partial regions.

4. The conveying device of claim 3, characterized in that the number of further discontinuous webs and, with that, the number of partial flights increases in the product-conveying direction.

5. The conveying device of claims 3 or 4, characterized in that regions with a larger number and regions with a smaller number of discontinuous webs follow one another in the product-conveying direction.

6. The conveying device of one of the claims 3 to 5, characterized in that regions with an increasing number and regions with a decreasing number of discontinuous webs follow one another in the product-conveying direction.

7. The conveying device of one of the claims 1 to 6, characterized in that the slope of the first flight increases in the product-conveying direction.

8. The product-conveying device of one of the claims 1 to 7, characterized in that regions B with a greater slope and regions A with a lesser slope of the first flight follow one another in the product-conveying direction.

9. The conveying device of one of the claims 1 to 8, characterized in that regions with an increasing slope and regions with a decreasing slope of the first flight follow one another in the product-conveying direction.

10. The conveying device of one of the claims 1 to 9, characterized in that the conveying elements are paddles or beaters.

11. The conveying device of one of the claims 1 to 9, characterized in that the conveying elements are shaped in the form of blades.

12. The conveying device of one of the claims 1 to 11, characterized in that at least

a first part of the conveying elements are paddles or beaters and a further part of the conveying elements are shaped in the form of blades.

13. The conveying device of one of the claims 1 to 12, characterized in that the first conveying elements, connected along the helical line on the surface of the shaft with the shaft and forming the first discontinuous web, and the further elements, disposed at least in partial regions of the first flight, are disposed in such a manner that a product volume, which is contained in the cylindrical chamber and, because of a rotation of the shaft, is moved a short distance further by means one of the first conveying elements in the product-conveying direction on a product path in the chamber, is divided and moved apart by at least one element of the further elements crossing the product path, before this product volume is taken hold of and moved further by at least one other of the first conveying elements.

14. The conveying device of one of the claims 1 to 13, characterized in that the first conveying elements are disposed at the shaft in such a manner, that the place, to which the product volume is shifted in the product-conveying direction by contact with one of the first conveying elements because of the rotation of the shaft, after a particular first angle of a rotation of the shaft, comes into contact with another of the first conveying elements further downstream, in order to be shifted further in the product-conveying direction.

15. The conveying device of one of the claims 1 to 14, characterized in that the number of flights in the product-conveying direction increases from one flight up to a maximum of eight flights.

16. The product-conveying device of one of the claims 1 to 15, characterized in that the axially adjacent conveying elements are disposed at the shaft offset by 90° to one another

(90° division).

17. The conveying device of claim 16, characterized in that the specific angle of rotation is equal to or greater than 90°.

18. The conveying device of claim 16, characterized in that the specific angle of rotation is equal to or greater than 180 °.

19. The conveying device of claim 16, characterized in that the specific angle of rotation is equal to or greater than 270°.

20. The conveying device of one of the claims 1 to 4, characterized in that regions with a different number of starts are determined by the first conveying elements and the further conveying elements in the product-conveying direction at the shaft.

21. The conveying device of claim 20, characterized in that the number of starts increases in the product-conveying direction.

22. The product-conveying device of claim 21, characterized in that the number of starts at the shaft is doubled from a first axial section to a downstream adjacent further section of the shaft in the product-conveying direction.

23. The conveying device of claim 21, characterized in that the number of starts at the shaft increases in each case by one flight from a first axial section of the shaft to a downstream adjacent further section of the shaft in the product-conveying direction.

24. The conveying device of one of the claim 16 to 23, characterized in that the further elements at the shaft preferably are disposed in such a manner, that the place to which a portion of the product volume is shifted in the product-conveying direction by contact with one of the further conveying elements because of the rotation of the shaft, after a particular, further angle of a rotation of the shaft, comes into contact with another of the further elements further downstream, in order to be shifted further in the product-conveying direction, the further angle of rotation being smaller than the first angle of rotation.

25. Preconditioner for preconditioning a flowable product, capable of absorbing a liquid, with a mixing chamber, which is designed for wetting the product with the liquid, and a residence chamber, which is designed for letting the liquid act on the product, characterized in that the residence chamber is a conveying device of one of the claims 1 to 24.

26. Method for transporting a conveyable, especially a pourable product by means of a conveying device of one of the claims 1 to 25, because of a rotation of the shaft, characterized in that a product volume, contained in the cylindrical chamber, is moved a short distance further by means of a conveying element of a first group of conveying elements in the product-conveying direction on a product path in the chamber and is divided and moved apart by at least one element of a group of further elements crossing the product path, before at least a portion of this product volume is taken hold of and moved further by at least one other of the first conveying elements.